"Although no large buildings were constructed during our stay, techniques of lifting massive timbers into position were exemplified by replacement of beams in two canoe-houses. In October a huge breadfruit log, more than two feet in diameter and sawed through at one end, drifted ashore from parts unknown. Such figts of the sea are the main source of supply for corner-posts of the canoe-houses. It was decided to use this one to replace a rotting post in the canoe-house called Fale Pēnga.

First the log was rolled ashore. Poles or light logs were thrust under it on the landward side to serve as skids. Similar posts were used on the seaward side as levers.

The hole in which the old post stood was now widened by digging on the outer side. Temporary supports for the roof at this corner were lashed together and put in position. The type of support used is shown in Fig. 7, a. At first the upper ends of the two pairs of uprights slanted toward each other at a considerable angle, greater than that shown in the sketch.

A double lever (Fig. 7, b) was now made of coconut logs to hoist the roof. There was room enough for more than a dozen men to work on it at a time. Their efforts were coordinated by a responsive song or chantey. As the sketch shows, the lift was transmitted to the stringer of the house through a crosspiece and upright post.

The height gained by each lift of the lever was secured by moving the lower ends of the supports toward each other, making the uprights more nearly vertical. The crosspieces at the base, to prevent them from slipping out again, were then repegged in the

new position. With the supports in position to take the weight of the roof, the lever was released and made ready for another lift by moving the fulcrum a little nearer the raising end. When the roof was high enough to give the necessary clearance to the corner posts, the supports were pegged in a final, nearly vertical position. They were then supplemented by a log cut to just the right length and set upright under the stringer a little in from the supports.

With the roof securely out of the way, the post to be replaced was removed. A heavy line, made up of six strands of the large size of sennit rope used for morring[sic] canoes, was fastened around its upper end. A fairly light pull on this was enough to topple the upper end of the post out from under the roof, so that its outer side rested against the side of the hole. It was then taken out of the hole by hauling on the line. This was the stage of the job requiring the greatest application of power. The haul on the line was supplemented by prying on levers thrust under the inside of the post (Fig. 4, c). At one time 39 men were hauling on the line. At the crucial moment some of [50] the women, who had been looking on and encouraging the workers, took a hand themselves. To prevent the post from slipping back while the workers paused for breath, the line was snubbed around two trees, passing from left to right around one of them, from right to left around the other (Fig. 7, d).

The new post, it now appeared, was a little longer than the old one. The hole for it was dug deeper, an easier task than cutting through the massive post again with axes

and hand saws. As the hole was deepened, it began to fill with water. The prospect of the water rotting the post at the bottom did not disturb anyone. When the hole had reached the necessary depth, one end of the new post was hauled into position over the hole. The other end was raised by the same techniques of prying on levers and hauling on a line that had served to remove the old one. The bottom of the post slid into the hole. It was then carefully lowered into the same position the old one had occupied. By holding the roof with the big lever while the bases of the supports were spread apart, a little at a time, the roof was gradually lowered back into position. The hole about the post was filled in and tamped. The temporary supports were removed, and the task was finished.

The whole process made nearly a full day's work for all the available men of Rauau district. It was done in the afternoon of one day and the morning of the next. Men were coming and going every now and then, so no one figure would give the number of workers accurately. The largest number actually busy at any one moment would be the 39 counted hauling on the line, plus three or four more with levers."

"Another repair job, requiring somewhat different techniques, became necessary in December, when the stringer that held up one side of the canoe-house Sabwōlap broke in two. Coconut logs, the only timber available for these long stringers, are not well adapted to the purpose. As their centers are rather pithy, the lateral stress imposed by the weight of the roof must be taken mostly by the thin shell of hard wood on the outside. Squared beams of a solider wood form the stringers of the men's house; but there are not enough logs of the necessary length to supply these for the canoe-houses.

In order to take out the broken stringer and replace it with another coconut log, it was necessary to raise one whole side of the roof. Accordingly, a row of temporary supports was required, instead of the pair that had sufficed for the corner-post replacement. But they were of lighter construction: pairs of light logs, crossed like an X, and held together with lashings at the top middle, and bottom (Fig. 8, a). Light logs, lashed under the rafters to take the weight of the roof while the stringer was being replaced, rested in the upper lashing of the X supports. The lower lashings helped to prevent spreading and settling. They were reinforced by pegs driven in at the base.

The roof was lifted, bit by bit, by means of a lever of coconut log. Since only part of the roof was raised at a time, a single log served for a lever, instead of the pair used on the corner-post job. The vertical post that transmitted the thrust of the lever to the roof rested at the bottom in a notch cut in this log. At the top it was lashed under one of the logs that temporarily supported the roof. The height gained by each lift was taken

up by narrowing each of the X supports tightening their lashings, and shifting the pegs (Fig. 8, b). Elderly men and boys worked on the supports, while young men at the height of [51] their strength worked on the lever. Getting the roof tilted to the necessary height, by many repetitions of this process, took about half a day.

The new stringer was now lifted into position. First each end of it was lifted upon a post, which leaned against a pile of crossed logs about waist high (Fig. 8, c). Then the ends were lashed to these posts at the point which would bring the new stringer into position on top of the corner-posts when the supporting posts were vertical. Long, stout lines were attached at each end. The log was now raised into position, with all available men hauling on the lines. At first a few lifted by hand on the ends of the log. At the hardest part of the pull, women, too, took a hand on the lines.

By releasing the lashings gradually, the new stringer was settled into position on the corner posts. Then the roof was let down on it gradually by reversing the process used to lift it; that is, it was held with the lever while the X supports were widened, then let down into the new position.

The stress of tilting and lowering the roof was too much for a tie-beam that supported one of the king-posts. It broke just as the roof was being settled into place. Apparently this piece of hard luck was not altogether unexpected; at least the men took it with good-natured resignation. Another lifting and lowering job was now required in order to replace the tie-beam.

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A log of pandanus, cut to reach exactly from the ground to the ridge-pole, was set up as a temporary substitute for the king-post. (This temporary structure was of the same type as that used permanently to support the ridge-pole of the men's house.) It was set up on a slant at first, then gradually raised into vertical position as the roof was lifted. This was done with levers and X supports, as before, except that a new type of lever was brought into use. A scaffold was built, consisting of four uprights, with crosspieces lashed to them at various heights. These cross-pieces served as fulcrums for the lever, higher ones being used as the roof gained height. Small supplementary levers were used part of the time. When the roof was raised clear, the new tie-beam was lifted into place by the same technique as that used for the stringer. The king post, a comparatively light piece, was passed up by hand to men standing on the tie-beam. Supplementary uprights were set up under the new tie-beam. These, and the temporary post holding up the ridge-pole, were left in place for several days, in case the new tie-beam was too weak for its load. When it proved to be adequate, the temporary supports were removed."